MvEcho

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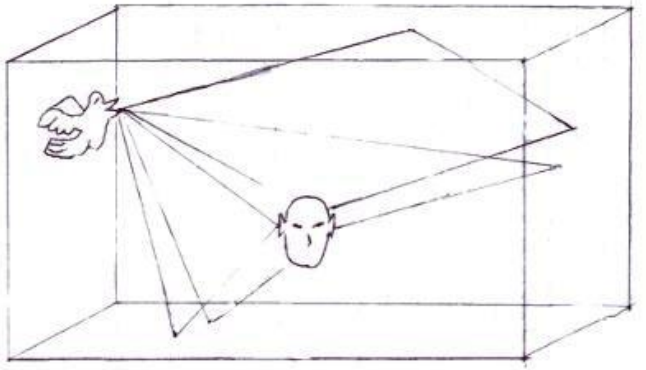
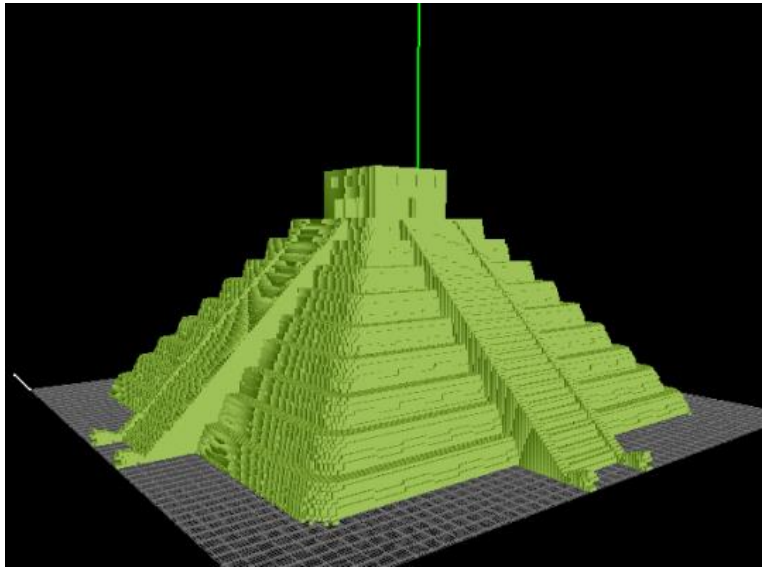
Auralisation



- Auralisation is the process of simulating the listening experience at a given position.
- The majority of existing auralisation algorithms require a manual description of the environment. MvEcho removes the need for this manual description.
- Technologies such as the Microsoft Kinect are available to scan, detect and measure objects in 3D space. Such scans can be used to obtain a voxel representation using binvox and VOLA.
- Initial implementation of MvEcho concerned the acoustic response of objects, namely the pyramid El Castillo, and has now been extended to model the response of rooms.

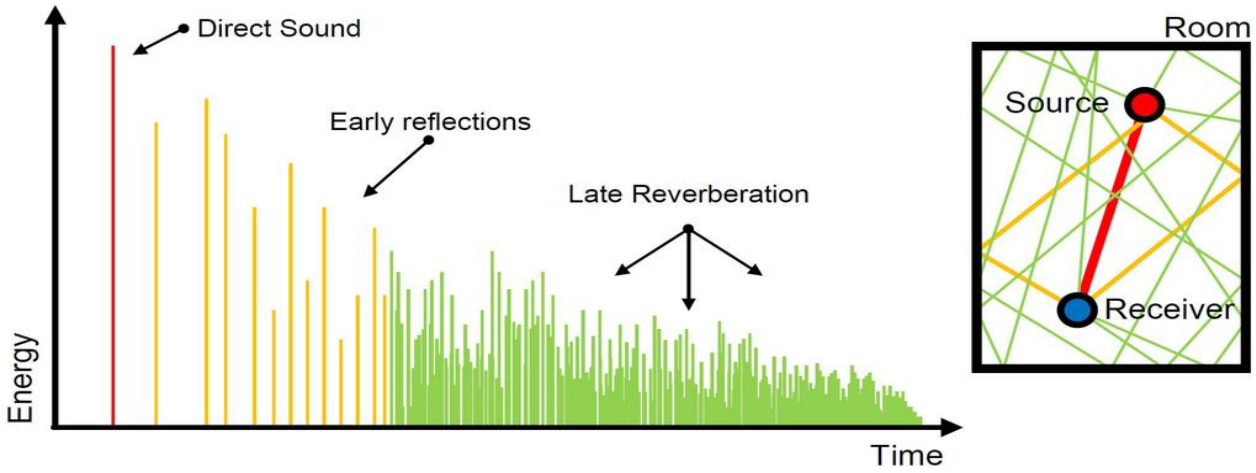
VOLA

- Voxels are used to represent regular rectangular grids in 3D space, the 3D equivalent to pixels.
- Voxel models are implemented using VOLA (Volumetric Accelerator), a software library developed by Movidius.
- VOLA is extremely memory efficient – storing either a single or two bits per occupied voxel.
- Models can be imported into VOLA from Blender models.



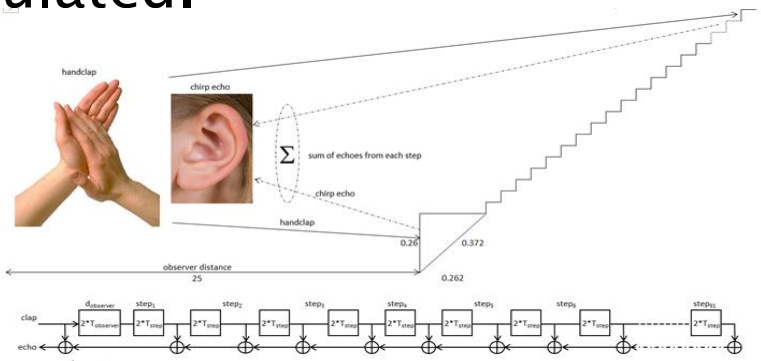
Ray Casting

- A single ray is cast out from the sound source towards each visible occupied voxel, and its path is then recorded back to the observer's head. These rays emulate early reflections.
- Late reverberations are not yet taken into account, but the figure below shows that the majority of the sound energy is carried in direct sound and early reflections.



Implementation

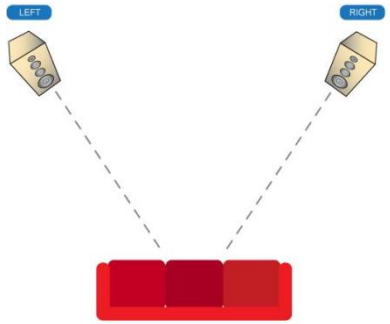
- The response of the environment is modelled using the information obtained from ray casting.
- The input stimulus is an approximation of an impulse such as a handclap. The user can specify the stimulus and observer locations.
- The attenuation and delay of each sample of the stimulus is calculated.



- MvEcho acts as an FIR filter to combine the response of each sample to emulate the acoustic response of the environment.

Use Cases

- Modelling of audio for VR – The user's surrounding are often neglected when providing audio for VR. MvEcho could model the acoustic response of the environment to allow for more realistic VR audio.



- Calibration of speakers and soundbars based on the environment and listener and speaker locations.